

Notes on the genus *Hyperolius* (Anura, Hyperoliidae) in central République Démocratique du Congo

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This paper deals with the treefrogs of the genus *Hyperolius* in central République Démocratique du Congo, an area delimited by the Congo-Lualaba River, and to the South by 5°S. This is a very poorly explored part of Africa. The study is based on the material in the Royal Museum of Central Africa in Tervuren and on the authors' collections in the area in 1975 and 2005. A number of little-known forms are commented upon: *Hyperolius robustus*, *H. schoutedeni* and the juvenile phase of *H. phantasticus* are illustrated in colour; *H. brachiofasciatus* is re-described and the difficult *H. nasutus* group is discussed. An unidentified *Hyperolius*, probably a new species, is briefly described.

INTRODUCTION

The area covered in the present paper is the ecoregion "Central Congo Basin Moist Forest" (OLSON & DINERSTEIN, 1998) in the République Démocratique du Congo, delimited to the West, North and East by the Congo-Lualaba River. The southern border is arbitrarily set at 5°S. This delimitation includes the tropical moist lowland forest in the ecoregion and furthermore the northern part of the savanna south of the great forest. The exact southern border of the area covered in this paper is of little significance since virtually no herpetological collecting has been undertaken in the southern part of the area, between 4° and 5°S. Also the remainder of the area is virtually unknown herpetologically. The considerable herpetological efforts in what was then Belgian Congo were concentrated on the three national parks, Albert (Virunga), Garamba and Upemba, all far from the present area. The only attempt at a comprehensive study of the genus *Hyperolius* in République Démocratique du Congo is that of LAURENT (1943).

The present paper is based on the material in the Royal Museum of Central Africa (MRAC) in Tervuren, material including a large unidentified collection made by the reverend father Paul Lootens in Boteka in 1985. His collection consists of more than 1500 specimens of the genus *Hyperolius* alone. This material is supplemented by collections made by the author near Kinshasa and in and near Salonga National Parc in 1975 during a largely non-herpetological tour, and in Kokolopori and Mabali in 2005. A gazetteer of important

localities is given in appendix 1. My material is placed in the Zoological Museum in Copenhagen (ZMUC). Below, formulae for the webbing of feet of specimens are expressed according to the method described in SCHIÖTZ (1975). Size of some specimens is given in millimetres, as SVL (snout-vent length). Samples preserved for DNA analysis were taken from all species collected by the author in 2005. They are stored at the Zoological Museum, Copenhagen.

The purpose of the present paper is not to make a catalogue of the material in the two museums but to study the genus *Hyperolius*. I have therefore left a large part of the material from Boteka unidentified since I believe that it is not possible to identify all the preserved specimens of the genus *Hyperolius* unless one is very familiar with the fauna from field experience, especially in a genus where much of pattern and colour vanish after preservation. Our knowledge in this area therefore remains incomplete; especially the sylvicolous fauna is almost unknown. The zoogeographical significance of the Central Congo Basin Moist Forest is further discussed in SCHIÖTZ (2007).

TAXONOMY

Hyperolius balfouri (Werner, 1907)

Comments. – Only one specimen (det. R. F. Laurent) is recorded from our area. The specimen has asperities on the back but no pattern or other distinguishing characters.

Material. – Bokuma: MRAC 52446

Hyperolius brachiofasciatus Ahl, 1931

Description. – A rather small *Hyperolius* (♂ 22.7–28.0 mm; ♀ 24.8–29.0 mm) with a pattern in two distinctly different phases (see below). For some body dimensions see table 1. Webbing moderate, formula: $1(1-1\frac{1}{2})$, $2(1-1\frac{1}{2})$, $2c(\frac{1}{2}-\frac{1}{3})$, $3(1-1\frac{1}{2})$, $3c(0-1)$, $4(1-1\frac{1}{2})$, $4c(1)$, $5(1\frac{1}{4}-1\frac{1}{2})$. Long-legged species with tibia more than half body length. Dorsum smooth in both sexes. No gular fold in females, indistinct or absent gular disc in males.

Colour after preservation (fig. 1). – Phase J. Dorsum light brown, often with darker spots which in some specimens form an “hour-glass pattern”. Dorsal colour sharply delimited against a darker, irregular lateral band. Canthal area of head also dark making canthus rostralis distinct. Conspicuous dark bar between eyes with a broad apex pointing back. Sometimes darker spots in lumbar region. Tibia with a conspicuous pattern with two large spots of the dorsal colour, leaving a dark, oblique band of the lateral colour between them. A small white spot present under the eye in most specimens. Venter unpigmented.

This phase is termed phase J (terminology after SCHIÖTZ, 1975, 1999) which should mean that no females belong to it, however two females of this phase are found in the large material from Boteka.

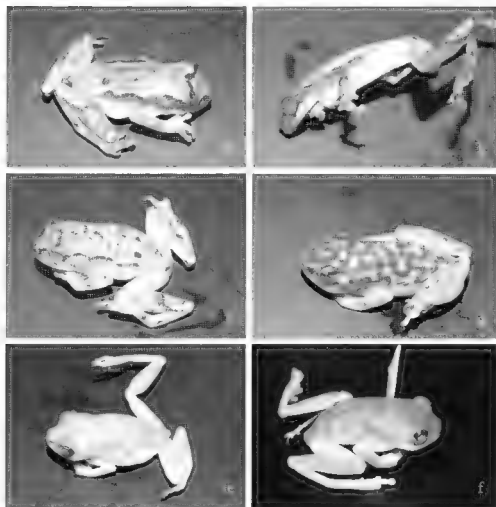


Fig. 1. *Hyperolius brahmoscirtus*. (a-b) Boteka, phase J, (a) dorsal view, and (b) lateral view. (c) Boteka, phase J; (d) Boteka, phase F; (e) Boteka, phase F; (f) Kokolopori, phase F.

Phase F: Dorsum dark with light spots sometimes marbled in dark and light. Some specimens are light with fine dark points. No dark lateral band or dark canthus rostralis. No white speck ventrally to the eye. Venter unpigmented. In life femur red (P. Lootens' notes).

The distinctness of my single specimen from Kokolopori was unfortunately first discovered after its preservation so I have no description of the colour in life, except for it being noted as "pink". It is slightly larger (SVL 29.0 mm) than the females from Boteka (maximum 28.2 mm.).

Table 1 Body dimensions of some Congolese *Hyperolius*. Collection references: MRAC, Royal Museum of Central Africa, Tervuren; ZMUC, Zoological Museum, Copenhagen. SVL, snout-vent length; TL, tibia length; ED, horizontal eye diameter; EN, distance eye-nare; TL/SVL, ratio tibia length/snout-vent length. Measurements are in tenth of millimetres, the ratio TL/SVL is in percent.

Species	Locality	Collection reference	Sex	SVL	TL	ED	EN	TL/SVL
<i>H. brachiofasciatus</i>	Kokolopori	ZMUC R.771206	♀	304	170	47	34	56
<i>H. brachiofasciatus</i>	Boteka	MRAC	♀	251	143	37	24	57
<i>H. brachiofasciatus</i>	Boteka	MRAC	♂	257	136	34	25	53
<i>H. brachiofasciatus</i>	Boteka	MRAC	♂	249	135	34	29	54
<i>H. brachiofasciatus</i>	Boteka	MRAC	♀	255	139	39	30	55
<i>H. robustus</i>	Monkoto	ZMUC R.079697	♂	307	148	45	39	48
<i>H. robustus</i>	Kokolopori	ZMUC R.771176	♀	335	165	50	39	49
<i>H. robustus</i>	Kokolopori	ZMUC R.771175	♂	337	179	54	39	53
<i>H. robustus</i>	Kokolopori	ZMUC R.771177	♂	295	163	46	27	55
<i>H. robustus</i>	Kokolopori	ZMUC R.771174	♂	316	165	55	39	52
<i>H. schoutedeni</i>	Garamba	MRAC	♀	225	105	26	19	47
<i>H. schoutedeni</i>	N'Sele	ZMUC R.079832	♀	252	118	30	28	47
<i>H. schoutedeni</i>	N'Sele	ZMUC R.079835	♂	225	108	37	25	48
<i>H. schoutedeni</i>	N'Sele	ZMUC R.079834	♂	229	105	34	31	46
<i>H. schoutedeni</i>	N'Sele	ZMUC R.079833	♂	202	93	30	23	46
<i>Hyperolius</i> sp	Mabali	ZMUC R.771206	-	407	191	54	34	47

Comments In the material from Boteka, two very distinct forms were found abundantly. One of the forms is identical to a single female I found at Kokolopori. In search of a name I came across a small collection (16 specimens) identified as *Hyperolius brachiofasciatus* Ahl, 1931 by R. F. Laurent. Eight of these, from Flandria and Eala, representing both patterns, are the same forms as the material from Boteka. The remainder has lost all patterns. I follow Laurent in his identification and in regarding the two forms as phases of one species although with some doubt. AHL's (1931) illustration shows a combination of the main characters found in the two phases, mottled back and a bar between the eyes. This combination of the characteristics of the two phases is found only in very few of the specimens I examined.

The slight doubt about the two forms being conspecific is caused by the presence of females in both phases although only two females phase J were found in the sample from Boteka (phase J is otherwise only shown in the genus by juveniles and males). Doubt is also caused by most of the samples from Boteka containing only one of the forms which could indicate that they are not syntopic or it could be caused by later separation by the collector.

This species has not been mentioned in the literature since AHL's (1931) description, except mere listings in FROST (1985) and JÖGER (1990), and was therefore, like other nomina dubia, omitted from SCHIÖTZ (1999). However, in spite of a lost type and slight doubts about the two patterns being conspecific, it would seem prudent to use AHL's name.

Biological notes. The single female taken by me was collected at a farm bush locality (sensu SCHIÖTZ, 1975) with *H. phantasticus* and *H. platyceps*. No voice was heard.

Distribution. Known from southern Central African Republic (type locality) to the central Congolian forest. All localities in MRCA are from the latter area.

Material. Eala: MRAC 40282, 9775, 51089-91 (5 specimens); Flandria: MRAC 3748, 52099, 12368 (3 specimens); Boteka: MRAC B 85052 0804-0814, 0862-0967, 0971-1024, 1026-1125, 1433-1490, 1790, 1898-1976, 2094-2102 (420 specimens); Kokolopori: ZMUC R.771206 (1 ♀). Also material, determined by Laurent, considered by me unidentifiable, from Boende and Bokuma.

***Hyperolius cinnamomeoventris* Bocage, 1866**

Voice. - The voice of the N'Sele sample was noted as being a fast series of clicks.

Colour in life. - Males from N'Sele: dorsum brown with small black specks; light brown dorsolateral lines; venter yellowish white; throat yellow. Females from N'Sele: dorsum a dense green delimited from the whitish venter by an irregular dark lateral line. The single female from Mabali agrees in coloration with the sample from N'Sele. This is in agreement with the colour pattern from elsewhere.

Comments. - The specimens from N'Sele are small (♂ 17-18.5 mm; ♀ 20.5-24.5 mm). Males from this sample have the typical male pattern for the species which shows sexual dimorphism. A large series from Boteka (39 specimens) is remarkable since all males except two have the female pattern (fig. 2a), a feature not reported for this species from elsewhere.

There is a suspicion that several cryptic species may hide under the name *H. cinnamomeoventris* (see LÖTTERS et al., 2004).

Material. - Boteka: MRAC 85052.1890-1897, 2103-2126, 2169-2175 (39 specimens); N'Sele: ZMUC R.771183-98 (11 ♂, 5 ♀); Mabali: ZMUC R.771207 (1 ♀).

***Hyperolius ghesquieri* Laurent, 1943**

Comment. A large *Hyperolius* (SVL 37 mm) with a characteristic pattern (figures: LAURENT, 1943; SCHIÖTZ, 1999). Only the female holotype is known.

Material - Befale: MRAC 1159 (1 ♀)

***Hyperolius kuligae* Mertens, 1940**

Comments. *Hyperolius kuligae* is well documented from Cameroun (e.g., AMILLI, 1978) and was furthermore recorded from Uganda with some reservation (SCHIÖTZ, 1999) and possibly as part of the material identified as *Hyperolius langi* from easternmost République Démocratique du Congo (LAURENT, 1972). One female (SVL 20.3 mm) from Boteka seems to belong to this species with its characteristic broad and flat body and head, and a pattern

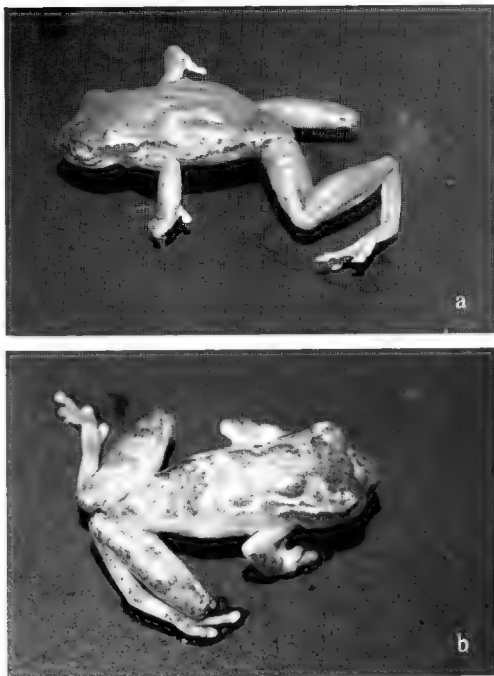


Fig 2 (a) *Hyperolius cinnamomeiventris*, Boteka, ♂ with + pattern (b) *Hyperolius kahigae*, Boteka, ♂

typical for the species (fig. 2b). The record should however be regarded with reservation; as one specimen of a species so similar to other *Hyperolius* is not sufficient to establish the presence of this form in the area.

Material. – Boteka: (MRAC B.85052.1793 (1 ♀).

***Hyperolius nasutus* group**

Comments. There seems to be two distinct species in the area covered by this paper. One of the forms is represented by a single sample (eight specimens) in P. Lootens' material from Boteka (fig. 3a). These specimens are small (♂ 19.0-19.7 mm, ♀ 17.5 mm) and with rounded snout, dorsum uniform light or with tiny dark chromatophores. A fine dark canthal line is present. Lootens' notes of colours in life indicate: "In life males light green, unstriped, yellow throat". This description indicates that the single female had light dorsolateral stripes. The sample was collected together with a series of *Afrizahus "fulvovittatus"* in "pineapple and aqueaceous herbs". This sample is tentatively referred to *H. adspersus* Peters, 1877 (see below).

Other samples from our area had been identified by R. F. Laurent as *Hyperolius nasicus* Laurent, 1943 (or *H. nasutus nasicus*). The type material from north-eastern Congo has a very pointed, shark-like snout, quite different from the rounded snout of the Boteka material (fig. 3b). The four half-grown paratypes of *H. nasicus* from the same locality have retained conspicuous white dorsolateral lines after preservation, unusual for the *nasutus* group since the light stripes normally tend to disappear when the green ground colour has vanished after preservation. The male holotype (SVL 23.4 mm) of *H. nasicus* is unstriped.

A single female in MRAC from Mayombe, i.e., from outside the area covered by this paper, was identified by R. F. Laurent as *H. adspersus* (SVL 23.0 mm). It is unstriped and has a snout shape similar to the sample from Boteka.

Considering the unsettled taxonomy in this group, no names are proposed for the material in MRAC. *H. adspersus* seems to be a likely name for the small material from Boteka, based on morphology and habitat (see comments below), whereas *H. nasicus* for the time being should be regarded as a separate species with unknown distribution. The material of *H. nasicus*, with the sharp, protruding snout and the ample pigmentation which is leaving the dorsolateral stripes conspicuous after preservation, is quite similar to *Hyperolius benguelensis* (Bocage, 1893) sensu POYNTON & BROADLEY (1987).

Taxonomy – AMIET (2005), in a study of the complex occurring in Cameroun, using voice, morphology and habitat preference, reached the conclusion that there are two species in that country. Amiet chose the name *H. ighettensis* Schiotz 1963 for the northern, savanicolous form, to indicate it being conspecific with material from Nigeria to central Côte d'Ivoire but he did not reject it being conspecific with one of the forms from the savanna further east and south in Africa. The other Camerounese species is parasyticolous, found in clearings in the forest ("farmbush") in southern Cameroun and is given the name *H. adspersus* Peters 1877 (type locality Cabinda, Angola). AMIET's (2005) meticulous study revealed subtle differences in morphology between the two species in addition to significant differences in habitat preference and voice. *H. adspersus*, the only parasyticolous species in the complex, is, according to Amiet, further distributed in coastal Gabon, south-western République du



Fig. 3. — (a) *Hyperolius* aff. *nasutus*, Botcka. (b) *Hyperolius nasutus*, holotype

Congo (LARGEN & DOWSETT-LEMAIRE, 1991, as *H. aff. nasutus*), lower République Démocratique du Congo and Cabinda (type locality), and probably coastal Angola down to 12°S.

A recent paper by CHANNING et al. (2002) has sent the *H. nasutus* group into a nomenclatural turmoil. According to them the parasylicolous *H. adspersus* sensu Amiet (as well as the distinct, remote savanicolous West African *H. lamottei*) should be termed *H. nasutus*, and the well-known and widespread savanna form in most of tropical Africa, hitherto called *H. nasutus*, be termed *H. acuticeps* Ahl 1931. These nomenclatural changes are further discussed in SCHIÖTZ (2006).

Material. Boteka: MRAC B.85030 1091-1098 (7 ♂, 1 ♀); Mayombe: MRAC (1 ♀, *H. adspersus* det. Laurent), Kasiki (Marungu, north-eastern Congo): MRAC (types of *H. nasutus* Laurent, 1943).

***Hyperolius ocellatus* Günther, 1859**

Colour in life of material from Kokolopori and Mabali Phase J (all males in most populations). Green with a silvery white triangle on the snout and broad white dorsolateral lines. The light triangle on the head is enclosed by a brown edge. Venter yellow surrounded by white and blue (fig. 4). Throat yellow

Phase F. Dense silvery grey with small black points. Venter bright yellow, edge of lower jaw white with black spots (fig. 4)

Comments Several subspecies have been described, but the variation within the species is not well understood. Only few specimens were heard in small forest swamps, localities for a sylvicolous or parasylicolous fauna

Material Kokolopori: ZMUC R.771200-04 (4 ♂, 1 ♀); Mabali: ZMUC R.771213 (1 ♂); Mundjuku, ZMUC R.771139-48 (10 ♂); Befale, MRAC (2 specimens), Bokala MRAC (1 ♀)

***Hyperolius parallelus parallelus* Gunther, 1859**

Comments. Only two specimens of the very conspicuous and normally very abundant *H. viridiflavus* superspecies are found in the collections of MRAC from the large area south of the forest down to 5°S, between the main distributions of the form *parallelus* near the Atlantic coast and of *argentovittis* in easternmost Congo, a stretch of more than 1000 km. This is an indication of how incomplete our collections from this area are. The westernmost of these two specimens (22°27'E, 03°28'S) is in MRAC labelled *parallelus*, the easternmost, only 150 km away (23°34'E, 02°23'S), *argentovittis*. They are, however, both typical *parallelus* with lateral lines parallel to the mid-dorsal line, not oblique as in *argentovittis*. The border or gradual transition between these very similar forms is therefore further east than assumed by SCHIÖTZ (1999: fig. 465).

The bewildering *Hyperolius viridiflavus* superspecies has been discussed in several papers (SCHIÖTZ, 1971, 1999, LAURENT 1976, 1983, WIECZOREK et al., 2001). SCHIÖTZ (1971) argued



Fig. 4 *Hyperolius ocellatus*, Kokolopori, ventral view of female (left) and male (right)

that the term subspecies for the many, often dramatically distinct forms are different from the subspecies concept commonly used. The species structure is also disputed. One school, especially with a South African perspective, regards all the forms in southern Africa as belonging to *H. nanmoratus*, and the forms in northern and western Africa as subspecies of *H. viridiflavus*. SCHIÖTZ (1971) argued, based on a few examples of syntopy and a great similarity in pattern between some south-western forms, for two widespread species, *H. viridiflavus* and *H. parallelus*. LAURENT (1976) in reality accepted this view but named the south-western form *H. marginatus* based on his inclusion in the species *parallelus* of a form, *marginatus*, with nomenclatural priority but doubtful affinity to either of the species (see further in SCHIÖTZ, 1971), until he, as an appendix to another paper on the subject (LAURENT, 1983), reached the conclusion that the superspecies with our present knowledge is best regarded as monospecific, with the species name *Hyperolius viridiflavus*.

WILCZOREK et al. (2001) studied the mtDNA in a number of forms and obtained a better understanding of the structure of the group. Concluding from an investigation of 74 forms, less than half of the "recognized subspecies", they separated these into ten full species. One of these full species is *H. parallelus*. In their cladogram, this species is widely separated from what I would assume to be its closest relative, *argenteovittatus*. The difference in mtDNA which the authors accept as sufficient for separation between species (one fixed character per clade) is small compared to species differences in other groups and several of their species show full reproductive compatibility and/or gradual transition in pattern. One unfortunate result of

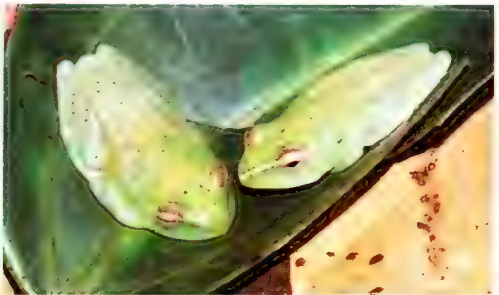


Fig. 5. *Hyperolius phantasticus*. (a) Kokolopori, phase I (b) Manget, phase I with canthal and dorsolateral stripe

proposing formal nomenclatural changes based on a study of less than half of the members of the group is that, if this nomenclature is adopted, it leaves the unstudied forms in a nomenclatural vacuum.



Fig. 6 *Hyperolius phantasticus*, Kokolopori, ventral view of males, phases J (left) and F (right)

The species name *parallelus* for the present material was used both by SCHIOTZ (1971) and WIECZOREK et al. (2001), although with different contents.

Material. – Kinshasa Botanical Garden, ZMUC R771182 (1 ♀); near Mbandaka (18°14'E, 00°20'S): MRAC (1 specimen); 22°27'E, 03°28'S: MRAC (1 specimen), 23°34'E, 02°23'S, MRAC (1 ♀); several specimens from lower Congo, outside our area

***Hyperolius phantasticus* (Boulenger), 1899**

Colour in life The species occurs in two very different phases (fig. 5-6)

Phase J. Head and body a light, transparent green, unspotted or with tiny dark spots. A light canthal stripe present in most specimens, in some individuals continuing behind the eye as a lateral stripe halfway down the body. Ventral side of body green, yellow and blue, often so that the abdomen is yellow, surrounded by green and with blue patches on the limbs. Throat blue or yellow. When calling at night the inflated throat is green to blue.

Phase F. Dorsal surfaces reddish to beige, sometimes with small yellow spots. Ventral sides of body and limbs wholly or partly black to dark violet. Throat bright orange or dark as venter, in some specimens with a blood-red small gular disc.

A few specimens show what seems to be a transition, dorsal surfaces as phase F, venter as phase J. After preservation all the colours of phase J and the dorsal colours of phase F have

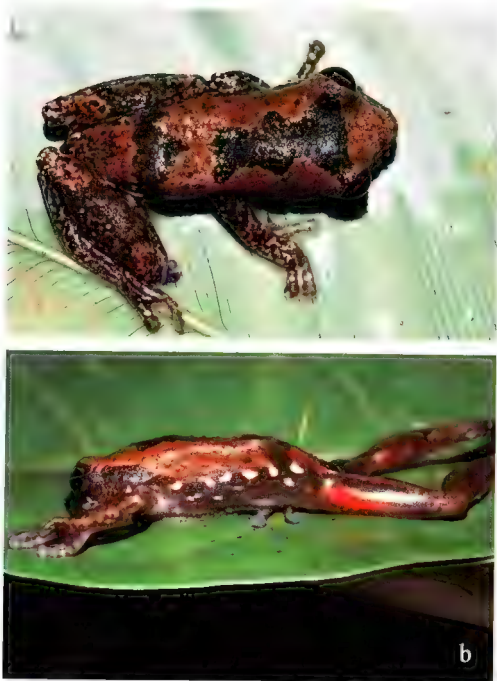


Fig. 7. *Hypelohus platycaps* Kckolopori. (a) morph A, dorsal view, (b) same specimen. Lateral view.

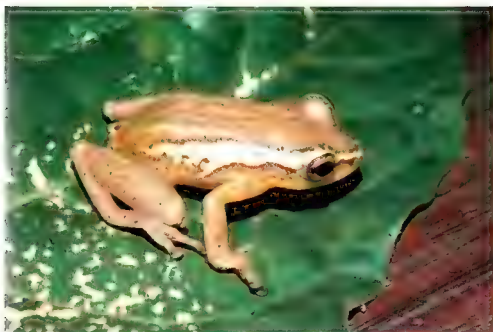


Fig. 8. – *Hyperolius platyceps*, Kokolopori, morph D

faded to a uniform yellowish. The canthal stripe is visible as a dark line in most specimens of phase J. Venter of phase F is dark. A colour illustration of phase J has apparently not been published previously. Several of the phase J specimens in MRAC are labelled *H. Boulengeri* Laurent 1943.

Comments. *Hyperolius phantasticus* was the dominant and the most conspicuous *Hyperolius* species in Kokolopori and Mabali. It is therefore strange how rare it is in the large collections from Boteka, 12 specimens out of a total of about 1500 *Hyperolius*.

Hyperolius phantasticus phase J is after preservation very similar to phase J of the more western *H. guttulatus* Günther 1859 which overlaps in distribution with *H. phantasticus* in coastal Cameroun to south-western Gabon. A difference between the two species is that *H. guttulatus* has a well developed gular disc, *H. phantasticus* has none or a small disc with much dilatate skin.

Biological notes. This species was collected at farm-bush localities together with *H. platyceps* and also in small, savanna-like swamps in the forest near the river (Esobe in French) at Mabali, where one would expect a savanna fauna.

Material. Ommamunda, Lodja: MRAC (38 specimens), Leopoldville, Flandria, Kunungu, Fala, Bokoro: MRAC, Ibembo: MRAC 52320 (1 specimen), Boteka: MRAC B 85052 0676-0677, 0697, 1778 (12 specimens), Kokolopori: ZMUC R 771214-26 (12 ?).



Fig. 9 *Hyperolius robustus*, Kokolopori, ♂

1 ♀); Mabahr ZMUC R.771227-36 (8 ♂, 2 ♀); Monkoto ZMUC R.771134-38 (3 ♂, 2 ♀); heard 10 km north of Watsi Kengo.

***Hyperolius platyceps* (Boulenger, 1900)**

Colour in life – The sample from Kokolopori falls into four apparently distinct morphs where the two dorsal patterns (hour-glass or dorsolateral lines), are combined freely with the dark or light venter. A (dark-bellied with hourglass pattern on back; 9 ♂, 1 ♀); B (dark-bellied with light dorsolateral lines; 2 ♂); C (light-bellied with hour-glass pattern; 6 ♂); D (light-bellied with light dorsolateral stripes; 7 ♂).

Morph A Dorsum dark brown with a black hour-glass pattern. Venter black, or black with small white spots, and with orange spots on the hidden parts of the groin. Throat black. Conspicuous white spots on the otherwise dark sides (fig. 7).

Morph B Dorsum dark with light brown canthal- and dorsolateral stripes, venter as A.

Morph C Dorsum light brown with darker brown hour-glass pattern. Venter white, throat yellow.

Morph D Dorsum light brown with white canthal- and dorsolateral stripes. Venter white, throat yellow (fig. 8).



Fig. 10 – *Hyperolius schoutedeni*, N'Sele

A female from Watsi Kengo had dorsum brown with green spots, and light canthal and dorsolateral stripes.

Voice. – A single, coarse click (noted as being similar to *H. concolor*).

Comments. – *Hyperolius platyceps* is a very variable species, both geographically and within populations, therefore much confusion has surrounded this name. AMIET (1978) clarified the systematic in Cameroun, also in relation to other species with a similar pattern (*H. kuhlgae* and *H. adumet-i*). The variation within populations was described by PIRRETT (1966), AMIET (1978) and LARGEN & DOWSETT-LEMAIRE (1991), rather than the two phases found in most *Hyperolius* with one phase, J (Juvenile) consisting of juveniles and some of the adult males, and another, ph (Female) consisting of some males and all females, for *H. platyceps* both morphs can be found among both sexes. As elsewhere the samples from Congo show two main morphs, one with hour-glass pattern (morph MD after AMIET, 1978), and another with light dorsolateral stripes and no hour-glass pattern (morph BL). In the Kokolopori material, both these morphs, however, occur in a light and dark version, the dark morph with conspicuous white spots on side of body. Such white spots are not known from Cameroun (AMIET, in litt.). In south-western Gabon all four collected females (LARGEN & DOWSETT-LEMAIRE, 1991) had a bright green dorsum, a morph not encountered in Cameroun or in Congo.

Hyperolius major Laurent, 1957 from southern Congo was described as a subspecies of *H. platyceps* and is very similar in pattern and morphology. It differs by the voice being a series



Fig. 11. – *Hyperolius* sp., Mabali (a) dorsal view; (b) ventral view

of hard clicks in rapid succession rather than the single click of *H. platyceps*. The recorded calls from Kokolopori are typical for *H. platyceps* and are identical to calls from Cameroun (SCHIÖTZ, 1999).

I found this species abundantly at Kokolopori and at Salonga, but strangely it is almost absent from the collections of MRAC, with only one specimen, from Flandria.

Biological notes. This species was collected in farmbush, most abundantly in roadside ditches near a small river, together with *H. phantasticus*.

Distribution. The present records represent a considerable extension to the East

Material. – Flandria MRAC (1 specimen), Kokolopori: ZMUC R.771237-61 (24 ♂, 1 ♀); Mondjuku: ZMUC R.079699-702 (4 specimens); 10 km north of Watsi Kengu. ZMUC R.079837-39 (3 specimens)

***Hyperolius robustus* Laurent, 1979**

Description – A large *Hyperolius* (♂ 30.2-38.3 mm; ♀ 33.5-37.1 mm). For body dimensions, see LAURENT's (1979) detailed description, and table 1 in present paper. Webbing well developed, formula of sample from Kokolopori: 1($\frac{1}{4}$ -1), 2i(1-1 $\frac{1}{2}$), 2e(0- $\frac{1}{2}$), 3i(1-1 $\frac{1}{4}$), 3e($\frac{1}{2}$ - $\frac{3}{4}$), 4i(1-1 $\frac{1}{2}$), 4e(1-2), 5(0- $\frac{1}{2}$). Gular disc large and flat (fig. 6 in SCHIÖTZ, 1999). Dorsum in both sexes densely beset with small asperities.

Colour in life Dorsum red-brown to yellow with diffuse dark spots (fig. 9). Some specimens almost unspotted, some with dominant spots. Iris golden. Venter almost uniform yellowish white, orange on the underside of the hind legs. The large, flat gular disc of males light yellow.

Comments. – LAURENT (1979), in his description and discussion of two new *Hyperolius* from Lodja (*H. robustus* and *H. sankuruensis*), compared them in a very detailed way with other members of the genus, including species with a very diverging morphology. Strangely he did not compare the two species with each other, although both the descriptions and the illustrations point at very similar frogs. The only difference extracted from the descriptions is that *H. robustus* is slightly smaller and less webbed than *sankuruensis* and that the male *sankuruensis* has dark transverse bands on dorsum (not apparent from the illustration). The two *H. sankuruensis* present in Tervuren (holotype and allotype) have no pattern left but seem to me to be very similar to *H. robustus*. The holotype of *H. robustus* is in agreement with my specimens.

Biological notes – The specimens from Kokolopori were taken in bushes, most of them rather high up (2 to 4 meters), in forest or dense farmbush near small watercourses. No vocal activity was heard at Kokolopori whereas a supposed "initial sound" was heard from a specimen from Monkoto.

Material. Sankuru. MRAC (type material), Kokolopori: ZMUC R. 771174-79 (5 ♂, 1 ♀), Monkoto: ZMUC R. 079697 (1 ♂).

***Hyperolius schoutedeni* Laurent, 1943**

Description. – *Hyperolius schoutedeni* is a very long-nosed frog with the body proportions of a large *Hyperolius nasutus*, quite different from *H. cinnamomeiventris*, with which it was compared in INGER's (1968) study from Garamba. The sharp snout and the presence of a mid-dorsal line in many specimens of *H. schoutedeni*, and the distinctive female pattern in *H. cinnamomeiventris*, clearly separate the two species. Some body dimensions are given in table 1. Webbing is reduced, the formula of a sample from N'Sele being: 1(1-1½), 2(1¼-1½), 2e(1), 3i(2), 3e(1), 4i(1½-2), 4e(1½-2), 5(0-½). The gular disc is large and flat.

Many of the frogs in the large material from Garamba (INGER, 1968) are smaller than the sample from N'Sele, and most lack the light mid-dorsal line.

Colour in life of material from N'Sele (fig. 10). – Dorsum brown with lighter dorsolateral stripes. In the field it was noted that only females (3 out of a sample of 6) have a light mid-dorsal line, after preservation this line is visible also on 2 of the 3 males. Throat is white (♀) or yellow (♂). In some specimens the hidden parts of femur and the upper side of feet are red. Venter is whitish. Females are only slightly larger than males (♂ 21.0-23.0 mm; ♀ 23.4-24.3 mm).

Voice. – It was heard at N'Sele. It consists in a double click.

Biological notes. – This species was found in a small swamp near Congo River in savanna or very open farmland.

Distribution. – This species is only known from République Democratique du Congo

Material. – Kunungu: MRAC (holotype), Bokoro: MRAC (1 specimen), Leopoldville: MRAC (1 juvenile; indistinct, identification probably correct); N'Sele: ZMUC R.079832-35, 771180-81 (3 ♂, 3 ♀); Parc National de la Garamba: MRAC.

***Hyperolius* sp.**

Description. – Female large, SVL 40 mm (see also table 1). Webbing formula: 1(1), 2i(1), 2e(1), 3i(1), 3e(1), 4i(1), 4e(1), 5(0). No gular fold. A characteristic coloration in life is dorsum dark chocolate brown densely beset with tiny bright green points, not forming any pattern (fig. 11a). After having been kept in a plastic bag for some hours the ground colour had faded to a light grey, still with the green points visible. Ventral parts are uniform orange (fig. 11b). After preservation the dorsal ground colour is dull dark grey with white points.

The large size makes it obvious to compare this female with the only other Congolese species with females that size (according to LAURINT, 1979), *H. sankuruensis*. Webbing is similar to the female paratype of *H. sankuruensis*, and the pattern after preservation does not show any distinct differences. But identification in this difficult genus cannot be based on size, as several species from western and eastern Africa have a similar size, nor on webbing or on lack of distinct pattern.

Comments. – A single specimen of a large, strangely coloured *Hyperolius* was brought by children in Mabali. I believe it to represent an undescribed species. It is however not advisable to describe a member of the genus *Hyperolius* based on one specimen, a female lacking the systematically important male characters, and a specimen which has not been studied on its breeding site. Therefore its formal description should await further studies.

Biological notes – The only known specimen was allegedly collected in low herbs along a road in farmbrush in former moist forest.

Material. – Mabali: ZMUC R.771205 (1 ♀).

***Hyperolius tuberculatus* (Mocquard, 1897)**

Comments. – Many records in our area in MRAC (see LAURENT, 1943).

ACKNOWLEDGEMENTS

I am most indebted to the Carlsberg Foundation and the Niels Bohr Legat for financially supporting my visit in 2005 to République Démocratique du Congo and to MRAC in Tervuren and the Niels Bohr Legat for contributing to this publication. My fieldwork in Congo was made possible through the support of the Bonobo Conservation Initiative (BCI), both in the preparatory process and as the necessary logistical support during the tour, a tour which was made pleasant and rewarding through the untiring support and enthusiasm of the director of BCI, Michael Hurley. His local partners also provided help and good company in a country where fieldwork is not easy. I am here especially indebted to Bienvenu Mupenda and Jean-Marie Benishay, both of BCI, Dr Mwanza Ndunda, Director General of Centre de Recherche en Ecologie Forestière, Mabali and Albert Lokasola, Vie Sauvage in Kokolopori. My stay in MRAC in Tervuren was made rewarding by the help and assistance of Dr Danny Meirte Mogens Andersen, Zoological Museum in Copenhagen assisted in many practical ways. J. C. Poynton is thanked for constructive criticism of content and language and A. M. Warfield for improving the language.

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APPENDIX I GAZETTEER

IMPORTANT MRAC LOCALITIES

Befale 00°28'N, 20°58'E
 Boende 00°14'S, 20°50'E
 Bokala 03°08'S, 17°04'E
 Bokuma 00°06'S, 18°41'E
 Boteka 00°20'S, 19°07'E
 Eala: 00°04'N, 18°20'E
 Flandria 00°20'S, 19°03'E
 Kumungu 02°06'S, 16°26'E
 Ommaniyundu (terr. Lodja): 03°21'S, 23°16'E

ZMUC LOCALITIES (COLLECTIONS SCHIOTZ)

Kokolopori: 00°15'S, 22°52'E. Dense secondary forest and farmbrush in forest. Several localities within about 10 km distance visited (villages Yalokole and Yotemankusi).

Mabali: 00°53'S, 8°08'E. Dense secondary forest and farmbrush in forest belt. Patches of partly flooded grassland. The old IRSAC station at the bank of Lac Tumba.

Monjuku: 01°35'S, 21°07'E. In Salonga North National Park.

Monkoto: 01°35'S, 20°40'E. Just outside Salonga South National Park.

N'Sele: 04°05'S, 15°03'E. North of Kinshasa. Very open farmland-savanna.

Ninga: 01°20'S, 21°15'E. In Salonga North National Park.

10 km North of Wasi Kengo, 00°46'S, 20°30'E. North of Salonga North National Park.